

**Automated Forex Trading Robot with FBH Robot On Metatrader 4 Platform
(Expert Advisor)**

By

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Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information System)

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CERTIFICATION OF APPROVAL

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September 2013

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

MUHAMAD SYAHIR BIN WAHID

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Abbreviations and Nomenclatures

EA: Expert Advisors

Forex: Foreign Exchange

Abstract

Forex Market is the biggest financial market in the world comprising of about \$3 trillion turn-over per day. It is an important instrument nowadays for international trade as well as determining the values of the money. With the floating exchange rate, people have managed to make use of the opportunities to make profit from the movement of price of currencies against each other. This people are called the foreign exchange trader or forex trader.

From this \$3 trillion market, 5% of them are retail foreign exchange market which caters for retail or small traders. With the advancement of technology, it is now possible for retail forex trader to trade forex online with real time market. The execution of entering a position into a market is now in a fingertip. However, despite the technology, people still faced problems trading be it in terms of time or even analysis.

Forex expert advisor or forex robot, which automate the trading purpose was introduced as solutions. It is designed specifically to help those who have a time constraint to trade or lack of knowledge in analysing the market. In theory, the expert advisors do show some promising traits, but the reality is not the way it is.

This project goes through the research, identifying the problem faced by traders in manual trading as well as problems of currently available expert advisors. This project aims to create a profitable forex robot that is able to give a return of 100% or capital back in one year. Some of the preliminary findings on this research have shown promising results of achieving this objective.

Chapter 1: Introduction

1.1.Project Background

The foreign exchange (FOREX) market is the biggest financial market in the world and is important for international trade nowadays. Forex market allows the buying and selling of currency and in turn market determines the relative value of currencies against each other (foreign exchange market, 2013). With this financial market, people have managed to make use of the fluctuations of the prices between currencies in the market to make profit. Today, people call it forex trading.

In short, the international monetary systems have gone through phases before finally arriving at current system. Based on Wikipedia, it can be summarised that international monetary system has gone through 4 phases which are Bimetallic, Gold Standard, Bretton Woods and the floating exchange rate regime (international monetary systems, 2013). The first one is the bimetallic system which is the usage of gold and silver. The usage is on gold and silver coins. This is even before paper money tied to commodities was introduced. Gold and Silver were the longest currency to have survived in the world.

After the world war, the nations in the world gathered in Bretton Woods conference. This conference purpose is to create an order that combined the benefits of integrated and liberal trade system. This means they are moving into free trade system but the problem is to agree on an acceptable monetary system. The result of Bretton Woods is that all nations agree to peg their currency into dollars while dollars will be pegged or backed by Gold. This system only lasts until the US decided to go into Vietnam wars. Post-Vietnam wars lead to a new system called the floating exchange rate regime which is used nowadays.

In a floating exchange rate regime, a term fiat money is used. That means this new paper money that is used is a legal tender. Before the fiat money was introduced, each paper money entitles the bearer to a claim of gold. Fiat money is a money that derives its value from government. What it means here is the money is only valid when the government says it is valid. No more gold or commodities to back up the gold

The introduction of floating exchange rate opens up the opportunity to trade the Currencies. Currency trading boomed and many brokers set up their own premises to cater for the demand of the traders. A portion of the forex market is called the retail foreign exchange trading which cater around 5% of the total forex market. Most of the retail foreign exchange trading is done electronically. All the orders will go into the market in real time.

With the advancement of technology, it is now possible to develop a forex robot that helps traders to automate most of their trading process. Forex robot is a program that is coded to do certain task mainly to assist in trading or automating a process.

The figures below will show the differentiation and the evolution of the trading process.

1.1.1. The traditional way of trading the forex market:

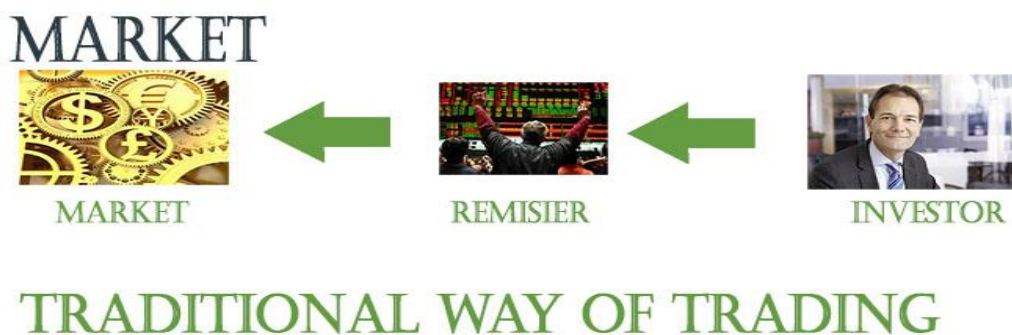


Figure 1

Traditional way of trading the forex market would require the investor or trader to use an intermediaries which we call the remisier. This remisier is provided by broker to assist traders or investors in executing the orders. Any buy or sell will be done through remisier who will in turn put the orders into the market.

1.1.2. Online forex trading process

When online forex trading was introduced, the broker have managed to improve the order execution. The former process was to use a remisier. However, with the introduction of online trading, they have managed to eliminate the need to use remisier and instead replace it with a software.

Online forex trading improves the whole trading process. Order execution into the market is now faster and more real time compared to when using a remisier. Instead of watching the news for quotation on the price, investors can also now view the charts in real time prices. They are able to do their investing decision faster. This also helps broker reduce the cost of employing staffs.



Figure 2

Automated forex trading

As technology progresses, it is now possible to automate the trading process. In short, automated forex trading eliminates most of the decision and execution process which previously need to be done manually by investors. The forex robot or we call it an algorithmic program coded to act on certain condition set by programmers. Mainly it is called Expert Advisor but in this report, the reference used will be forex robot. Its function is mainly to assist but with more complex development, it can prove to help improving the whole trading process.



Figure 3

1.2.Problem Statement

Retail foreign exchange trading proved to be a profitable ways of making money although it covers only 5% of the forex market. Therefore many people tried getting involved in this business and with the use of electronic trading, it has help accelerates the whole trading process. Regardless of electronic trading technology, trading requires commitment and a lot of other crucial factors to succeed. Those factors include good money management, controlled emotions as well as high capital. Introduction of leverage concept by online retail brokers enable people to trade the forex market without the need of a big capital. However these two problems are still unsolved.

Money management and controlled emotion is highly related. With a good money management, there is a guarantee that you will be able to control the risk and reward in trading. Trading is investing where risk and reward must be managed carefully. However, without any controlled emotion, the money management could deviate from what it should do. One of the reason why forex traders fail is because of trading discipline in which they let their emotions control their trading decisions (Stammers, 2013).

Other than that, lack of time to spend in trading is also one of the current problems faced by many traders. In Malaysia, most of the traders are only retail traders. The trading done is only minimal because of time constraint. If only they are able to automate their trading, then they could capitalize more on the opportunities offered from trading the currencies online.

There are tons of expert advisors or forex robot that has been developed with the goal of automating the trading process and also making profit for the traders. However, the problem with current expert advisors in the market is that it is rare to find one that is sustainable. In this research report, sustainable will mean that the forex robot is unable to produce any profit in its end result. This also means it is rare to find an expert advisor that is able to survive through the ups and downs of the forex market. The challenge faced by many expert advisors developer is to create the algorithm for the expert advisors that is able to deliver a good risk and reward ratio.

1.3.Objectives of the Project

- To find suitable techniques that have good risk and reward ratio and have more win than losses
- To automate the analysis and order entering process of forex trading in Metatrader 4
- To create a profitable forex robot that is able to provide a return of at least 100% in one year through backtesting

1.4.Scope of Study

The main purpose in this study is to automate the trading process. Therefore, there will be three core things that need to be studied in order to develop this expert advisor. Those three things are:

1.4.1. Analysing Proven Trading Techniques

In technical analysis techniques, a study will be done to choose which of the technical analysis technique is already profitable. Not all technical analysis can be automated fully, therefore, the focus would be on a simpler technical analysis techniques.

Other than that thorough study will be done to know whether there is more possible way for the expert advisor to help in analysing the market.

1.4.2. Studying the Market Pattern

Forex market has a lot of random patterns but most of the patterns do happen over and over again. A lot of professional traders have identified which type of market patterns is safer to trade and which one is not. Utilizing these market patterns and combining it with technical analysis will increase the probability of winning the trades.

1.4.3. Forex robot Testing

The expert advisor or this forex expert advisor testing will be different from typical software testing. It will require the forex robot to go through backtesting as well as forward testing. Backtesting is testing done using past data and forward testing is using the latest data.

Chapter 2: Literature Review

There have been many debate and discussion around the usage and development of forex robot. Traders argue whether it is risky or not to use forex robot to do all the trading. Some traders find it profitable and some see it as a dangerous risk to take. The opinion differs. As for developers, the opinion differs on what type of expert advisors is good to develop.

Forex robots can either assist or fully automate the whole trading process. For this project, the main focus would be on researching on automating whole or most of the forex trading process.

2.1.The advantages

In a research done by Stockhus Saul (2011), he supports the usage of forex robot or what he calls it as algorithmic trading. In his research, he states that there are four advantages of using forex robot which are:

- No human errors
- No subjectivity
- Based on statistics
- Takes little time once operational

The disadvantages part outlined by Saul is only in the development and testing part of the forex robot. He did not object for the use of forex robots to automate the trading process (Johnson, 2011).

Another argument that supports the usage of forex robot is from an article written by Matthew Johnson. Johnson agree that expert advisors do have its own advantage such as giving the freedom to people as well as eliminating the mistakes most human made which is emotion. He defines emotion for trader as fear and greed but can be overcome by using forex robot. His justification is that expert advisors trade the forex market using specific instructions or rules and is not governed by emotions (Johnson, 2011).

One of the best parts of forex robots is that most of them are programmed to do the analysis automatically. This means the trader themselves do not need to do any

significant work on analysing the market. This saves about 80% of the work done manually. For traders, analysing the market is a time consuming part. This is further supported in an article which states that expert advisors cover the trading process and will not require deep knowledge on forex market (Johnson, 2011). It is like a plug and play where you just run the program and let it do all the work.

2.2.The Disadvantages

Despite the advantages and theories on how forex robots can bring greater good, the market still fails to produce a sustainable forex robots. Most of the available expert advisors on the market only work in short term or on specific market condition. At least that is what the one being tested shows. Whenever the market reaches high volatility, most of the forex robot failed to work properly. This means the forex robots will need to be constantly updated to keep up with the market, however, this is considered as an inconvenience to both the trader and the developer.

Different currency pairs have different kind of behaviour. Therefore, different ways of approaching the market will be needed. That means an expert advisor might only works for a particular currency and not for others. This creates a limitation to trade in other currencies as well as reducing opportunities.

2.3.Platform and Programming Language

The famous platform used now to conduct the retail forex trading on the internet is the Metatrader, developed by Metaquotes Software Corp. The current software used is called Metatrader 4. It is used by most of the brokers around the world. Some brokers even offer their own software to trade, however they also offers an option to use Metatrader 4. This software has become the preference for many traders because of its flexibility and wide range of analysis tools that it offers.

The company also introduces the programming language that can be used to develop programs, scripts or expert advisors that is compatible with the platform. The MQL 4

programming language introduced opens up the opportunity for developers to code their own forex robots which the main purpose is to automate the process.

Before such platform or programming language was introduced, only the banks or big financial institutions have access to sophisticated trading programs. As for electronic trading, each broker will provide their client with their own trading platform. Each broker uses different platform but follows the guideline given by National Futures Association (NFA).

NFA outlines the standards of electronic trading platform that the brokers must follow. Each trading platform must have:

- Authentication (Passwords, Authentication Tokens such as secureID cards; or digital certificates)
- Encryption
- Transactions recording standard
- Pricing and slippage standard

This NFA standard was retrieved from Wikipedia (foreign exchange market, 2013).

2.4.The Developer's Challenge

In developer perspective, there are many challenges and conditions that need to be met in order to develop a profitable forex robot. Contrary to manual trading, using forex robot requires additional measures to be taken into consideration. This includes research programming, market theory, algorithmic price analysis as well as thorough understanding of the financial market itself. This does not include the testing part. Nevertheless, the real challenge for developers is translating the trading techniques into codes or algorithms and testing the robot for profitability.

Most of the research above seeks to identify the opportunities and potential problems that an expert advisor could bring. There are mixed reviews on whether it is applicable in the real situation or is it feasible to create one that meets the debated criteria. For this project, the author is supporting the decision to use forex robot in trading the forex market.

2.5.Frequently Used Forex Techniques on Forex Robots

The frequently used forex technique on forex robot is usually a technique that does not use any stop losses and they always use a layering technique. This layering technique can be martingale or non-martingale.

Martingale technique is popularised in 18th century. It was introduced by the French mathematician by the name of Paul Pierre Levy (Lien, 2011). It is originally used in betting system. It uses a concept of double down. For example, when it is used in betting, when the first bet is a loss, the second bet will be made. However, the second bet will be doubled compared to the first one.

When applied in forex trading, it is a layering technique in which when the first entry in the market did not go our way, the second position will be initiated with double in lots. There is a mathematical calculation that should the price move only half of the movement from the first position, the trader would already have a break even position. Usually in forex, martingale is used to maximize their returns as much as possible. It is also famously used in many forex robots (martingale trading system, 2013).

Another set is non-martingale which is just a layer technique. This technique means everytime the price go against our way, it will open another position with the same lots. This is more of an optimism technique that the price will eventually go into the first position of entry.

Both techniques are risky but is popularly used in forex robots. The concept of this technique is with the hope that the price will eventually move into the first position. Some people argue on why it is a requirement to make layering technique. This is because sometimes it might take months before the price could eventually move into the first position. Therefore, in order to make up the time value of money, the layering technique is used to increase the equity and maximizes earnings.

Sometimes the price might have its ups and downs making way for the layered post to give profit. This will make up for the time value of money as well as increasing the equity for the account. Increased in account's equity will help in increasing the risk of account being wiped out.

2.6.Related Works on Forex Robot

The improvement in technology has allowed the economists and traders to try and predict the financial markets.

A lot of things were developed to predict the market accurately. Example is the Artificial Neural Network (ANN) which can be used to predict the FOREX market. Despite the existence of this program, it is not easy to implement it. This is because there are many factors that influence the volatility and movements of forex markets. Such factors include political events and economic news which is unpredictable. This makes it hard for a successful neural network model to be implemented.

Another proposed model to improve the algorithmic trading is to use a self-adapting architecture. In this case, the proposed thing is to use genetic programming (GP). The goal of GP is the design and adaption of simple predictors. This simple predictors can be used by both parties which is the system itself or by humans. The drawbacks of GP is it have a high probability of predicting wrong turning points. Wrong turning points in forex market is the reversal point in forex market. If the market is bearish, the turning point is the point where the market should start to be bullish.

The third model is the radial basis function (RBF) networks and AutoRegression Moving Average (ARMA) models. This involves the combination of model.

Despite all the different model developed for improvements, this research is focusing on the basic way of implementing the algorithmic trading. This means the development of forex robot will not be using any of the model. It will be using a simple programming, coded using MQL4 and is following the rules of a specific technique.

Chapter 3: Research Methodology and Project Activities

There will be 4 phases to be done for this project consisting of:

- Gathering data
- Trading techniques research
- Programming
- Testing phase

This figure below shows the exact process of doing this methodology starting from gathering data and ending with testing. Gathering data is expected to be done once while other research stages will be the main focus.

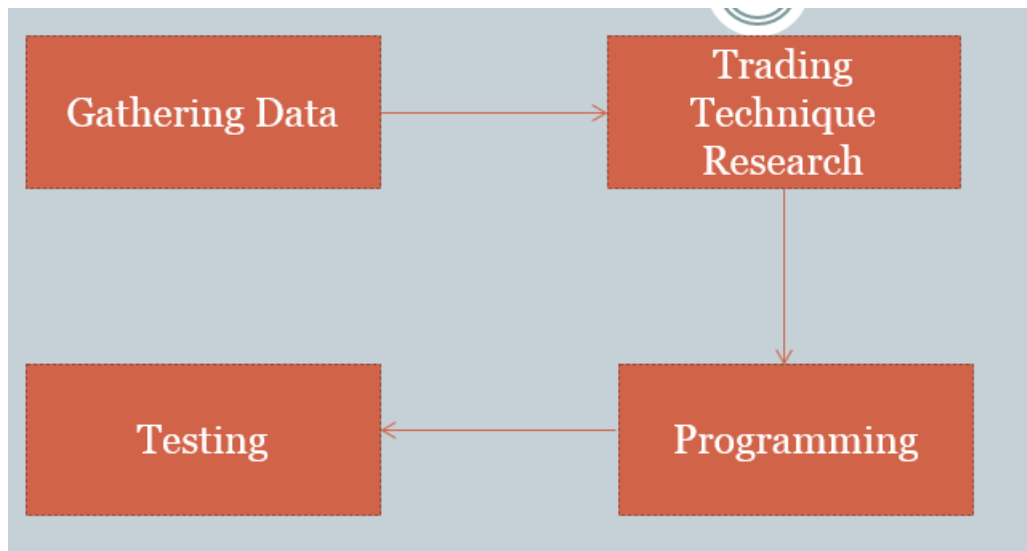


Figure 4

3.1.Gathering Data

Gathering problems means gathering more data about problems faced by trader that can be solved using forex robots. This research could also identify the current problems posed by currently available expert advisors.

The gathering data will be done using qualitative method or using past data. With qualitative method, a few people involved in online retail trading will be interviewed and the result of the interview will be analysed. This project requires feedback from users to identify the required problems to solve and qualitative method is the best way for this. Another way is to use past data in which people that had done the same analysis to identify the problems of current forex robots or problems without forex robot. Identifying problems using past data also includes testing current expert advisors with historical data to get the potential results.

3.2.Trading technique research

The research on trading techniques will be done by gathering a few trading techniques that is conventionally used in the market. Each of the technical indicators used for trading will be thoroughly analysed to know how each indicator works. A technical indicator is a metric with values generated from generic price activities of the stock or assets which in this case are currencies (Technical Indicator, n.d.).

Finding the trading techniques will be done by analysing the trading techniques and see into which category does it fell. This project will categorize trading methods into two types which are martingale or with stop losses. In simpler term, a martingale trading methods means the trading techniques will have no stop losses and vice versa for the latter.

Which type of trading method to use depends on how effective each method can achieve the required objective.

3.3.Programming

Before starting the programming for the forex robot, it is good to have a list of references on how certain trading conditions is coded. This can be done by gathering the already available forex robot on the internet and studying the coding pattern. This will help in accelerating the programming process.

3.4.Testing phase

Testing phase will be divided into two types which are software testing and market testing. Software testing will be done by beta testing. A few traders will be selected to try and use the forex robots and report any bugs or faults found. Faults or bugs can be in many forms be it in terms of trading or software functionality.

The market testing will be done through backtesting and forward testing.

3.4.1. Backtesting

Backtesting is a tools incorporated in Metatrader that enables simulation of trading in a specified period of time to be done in minutes. It is only an approximation of how the forex robots would work in real time (Testing Expert Advisor, n.d.). Despite that, it is the best tool to be used for testing purposes before sending it into live markets.

The backtesting means the forex robots will be tested to trade on the market based on the historical data. The historical data used will be provided by the brokers themselves. To ensure the integrity and validity of this backtesting, this forex robots will go through a test of minimum of 6 months historical market data.

In order to ensure the backtesting result is optimum, it is vital to have a complete and accurate historical data. This will mean we are going to need to get the best historical data available.

In backtesting, we are able to obtain some essential results such as:

- Total net profit - This will be the gross profit – gross loss
- Profit factor – the ratio of gross profit to loss. Higher profit factor would mean a better performance. It is essential to set a profit factor benchmark in order to align it with the research objectives
- Absolute drawdown – Drawdown is the likelihood that an account will be blown out

- Modelling quality – This is important for the backtesting is done on ticks which means every single price fluctuations. Therefore, it is important to get a model that have an accuracy of at least 90%

Backtesting also enables us to see whether the coded forex robot is following the rules. This is a preliminary bug finding method. However, for this project, backtesting result will be the main result to know whether this forex robot has achieved its objective or not.

3.4.2. Forward Testing

All the results generated from the backtesting can only be considered as on paper results. The real thing that differentiates this forex robot from others is whether it can achieve profitability in real market. This is done through forward testing. Forward testing means it will go through testing in live market situation where the market is volatile. Results generated from both testing will be analysed.

In live market situations, the forex robot will be tested on whether it is able to react with live market situations. Sometimes when the market is volatile, the price fluctuations is too rapid and some forex robot might not be able to catch up with the movement.

This will be the last testing phase because the results generated is the key results. This result will be used to check whether the forex robot have managed to achieve its objectives or not. For this research, forward testing result would be optional and is not the main gauge to be compared with the objectives.

Chapter 4: Results and Discussions

Based on the four methodologies, here are some of the preliminary findings from the research done for this project.

1. Problems Assessed

This is in the gathering data stage. Based on the past data and research, we have managed to obtain a common problems that can be solved with the establishment of forex robot. The main thing is solving the current problems faced by traders. A lot of research has been done on what is the problem of using forex robot and what is the problem without automatic trading. Therefore, the only thing left is for the solutions. The problems can be referred the problem statement.

Some codings and backtesting on current forex robots were done, and it shows that most of them fails. This test is done to confirm the validity of the objectives and problem statement. When a forex robot fails, it means it fails to even generate a profit and some even go to an extent of wiping out the entire capital in the testing period. The end result of testing is what's counted.

Brokers and Platforms to use For Forex Robots

After thorough research, there are lots of available retail brokers on the internet. The most important thing is to find a reliable and trusted one that will not scam investors money.

When using a forex robot, it is important to know whether the broker's offered trading platform is compatible with this forex robot. Most of the brokers usually use the Metatrader 4 Platform which have the Expert Advisors feature. This means, it can enable a forex robot to run. In some cases, a broker will offer their own platform and this custom platform might no be able to utilize this forex robot due to differences in system.

In short, the criteria of choosing a broker for this forex robot are:

- The broker must offer a metatrader 4 platform
- The broker must be trusted and preferably certified
- The broker's server must be stable and will not disconnect frequently
- At least the broker is able to provide a minimum leverage of 1:1000
- Swap-free account (interest free account)

- Low spread

These are some of the list of available brokers that meet the criteria and already have an established list of customers. They are:

- Exness
- Liteforex
- Hotforex
- Alpari
- FXCM
- TadawulFX

For this research purpose, a wide range of brokers will be used for backtesting and only one broker for forward testing. The reason being is to get the most accurate and consistent database of historical market price.

Forex Robot tested

The list of EAs tested are:

- Forex Hacked
- Muslim EA
- Stochastic EA

The results of backtesting are as follows:

ForexHacked

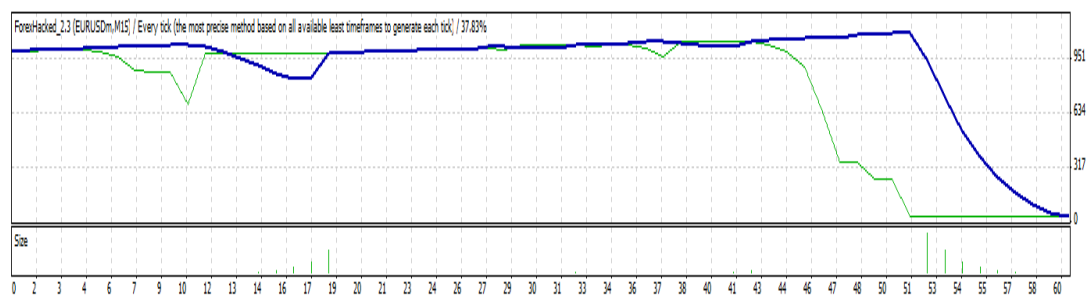


Figure 5

Muslim EA

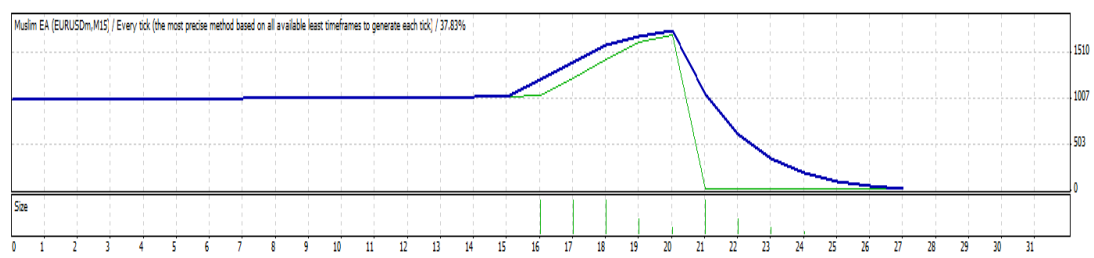


Figure 6

Stochastic EA

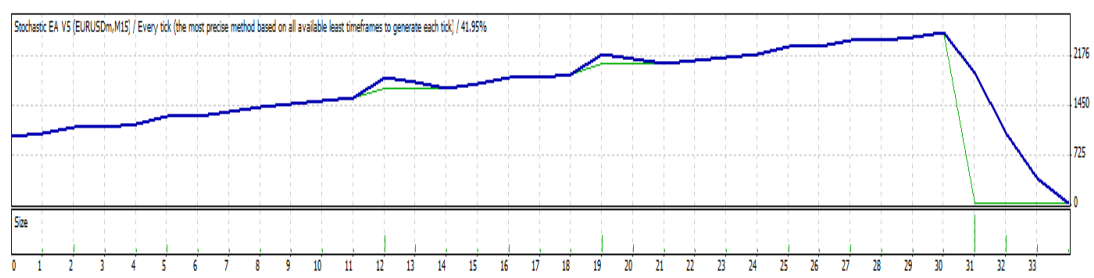


Figure 7

From the three Expert Advisors or forex robots tested, both gives the same end results. All 3 robots have managed to wipe out the account in less than a year. This test was done with the following factors:

Capital: \$1000

Time tested: January 2013 – August 2013

The starting capital for backtesting is \$1000. Although some of the robots managed to make some profit, but the end results were that the account capital have been wiped out. This is not in conjunction with the objective set in this research.

Therefore, from the results, it can be confirmed that the following problems are present:

- Most forex robots are not sustainable. It is not able to sustain the market in one year and eventually have all the capital wiped out.

This results also confirms the relevancy of continuing with this project and the relevancy of the objectives outlined. The benchmark results gathered from this testing is zero profit.

2. Trading Techniques Research

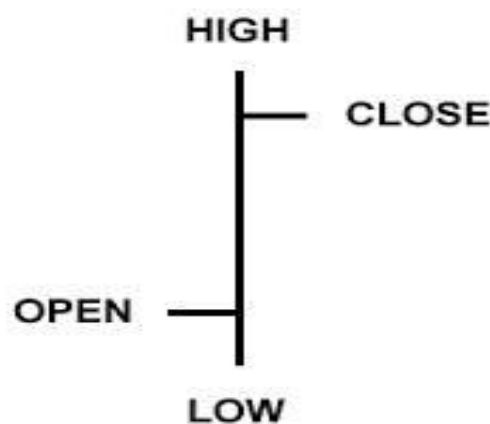
Before going into the trading techniques research, there are some basic things about forex trading that needs to be understood. The first thing is about technical analysis. Regardless of what technique chosen, most of it is about technical analysis which requires analysis on charts.

Usually technical analysis uses indicators to filter the market condition. The basic of technique is explained below.

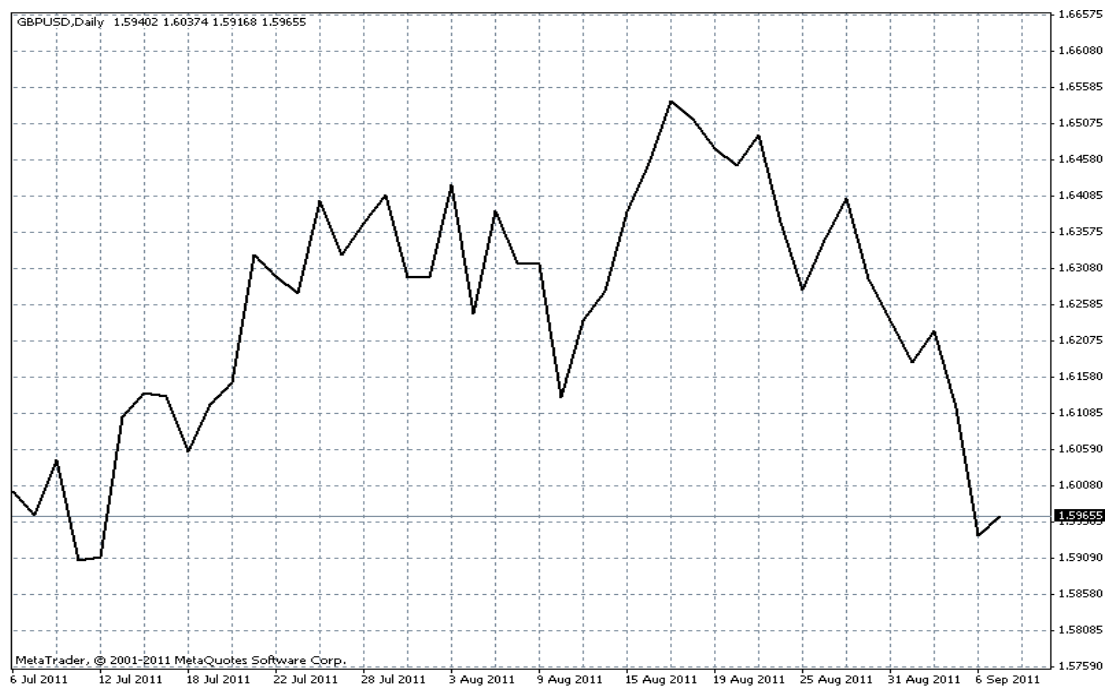
2.1. Charts

There are three types of charting used in forex market. They are line chart, bar chart and candlestick chart. Each chart has different sets of information to show for the trader to analyse. The famous chart used in forex market is the candlestick chart.

The bar chart will have only show its open, high, low and close price which is as follows:



As for line chart, it only shows a very limited option which is the close price. Despite each chart limitedness, it have its own usage and complements each other. Line chart is shown below:



On the charts, for monitoring the movement of currencies, we will use a candlestick chart. Candlestick is a tool that originated from Japan (Walton, 2010). It is used to monitor the momentum of prices. The diagram below shows the characteristics of candlesticks.

Bear in mind that this is the basic look of candlesticks. Candlesticks can have many forms which show the condition of market at that time. However, for this technique, it is not necessary to go into the details of candlesticks.



2.2. Technical Indicators

Technical Indicators or indicators in context to technical analysis are tools develop to assist in analyzing the market. It is a result of mathematical calculations derived from prices or volumes. The values obtained are used in the forecasting and analyzing the markets.

2.3. Stochastic Oscillators Martingale Technique

This is another trading technique that is currently being analysed. Based on a few backtests, this technique had shown quite promising results. There will be a certain time when this technique will cause the account to be wiped out. However, due to its good reward, it is being included into this research.

This technique uses simple tools and simple rules. There are only a few conditions to enter the market and the rest will rely heavily on its money management.

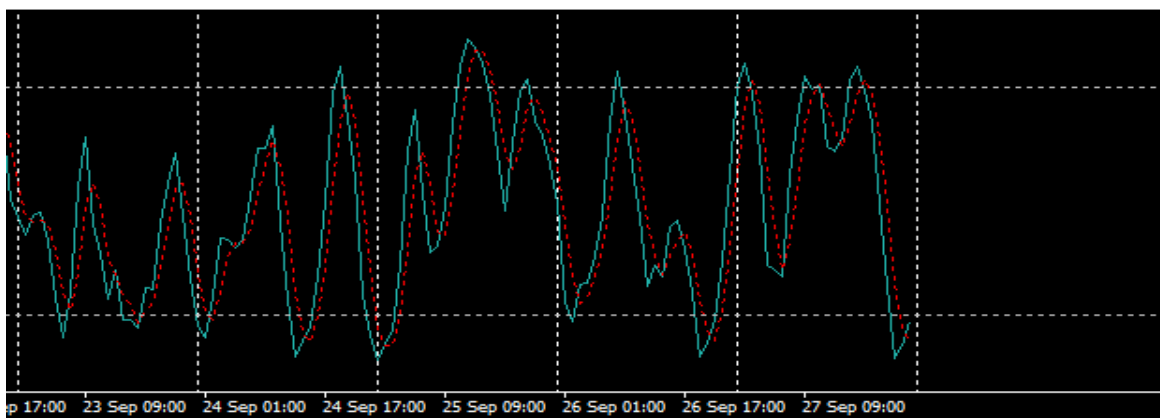
Indicators

Indicators that are involved in this technique will be the stochastic oscillators. This stochastic oscillators is a tool which compares the currencies price closed relative to its price range over a given time period. The meaning is complex and this research is not to understand the underlying process of stochastic.

On stochastic oscillators, there will be two lines which is called the overbought and the oversold lines. These lines are the main focus on this technique. Whenever stochastic values reach that oversold/overbought line, it will be the benchmark that the market is at a critical point of reversing.

Oversold means that the price have been bearish for too long and is now in a possibility that a retracement or reversal will occur. As for overbought, it means the price have been bullish for so long that now it enters an area where a possible reversal or retracement will occur.

The figure below shows the oversold and overbought line of a stochastic oscillators.



The upper line is the overbought line while the bottom line is the oversold line. The line is crucial in determining the entry position for this technique.

2.4. The martingale original method

The martingale is a method in which we use probabilities and layering. This will be a more thorough explanation on how martingale works in forex trading.

In order to better understand martingale, we can look at this scenario.

We buy EURO at 1.3450, profit target at 1.3500 and stop loss at 1.3400. Therefore, if the market hits our profit target, it will make a profit of \$50 or if it hits the stop loss, it will make a loss of \$50. In this case, the first position netted a loss of \$50.

In martingale, the second position we are going to enter will be the double from the previous lot. The first position lot is \$1, therefore this new position would be \$2. Lets say the buying price is 1.3400, profit target at 1.3450 and stop loss at 1.3350.

Calculating back, the total profit can achieve \$100 or the total loss could also be \$100. If the market hits the target profit, it would have made a profit of \$100. This new \$100 subtracted with the previous losses would result in a net profit of \$50.

First Position = -\$50

Second Position = \$100

Subtract both of it = \$50

Therefore a net profit of \$50 is achieved. This is the concept of martingale that is being applied here. If the trader is a risk conscious and could not bear waiting for profit target and wanted to cover his losses, he only need to wait for the price to go at 1.3425 instead of the target of 1.3450.

2.5. Trading conditions

There are trading conditions which needs to be followed accordingly. In short, the trading conditions are:

Timeframe: 1 HOUR

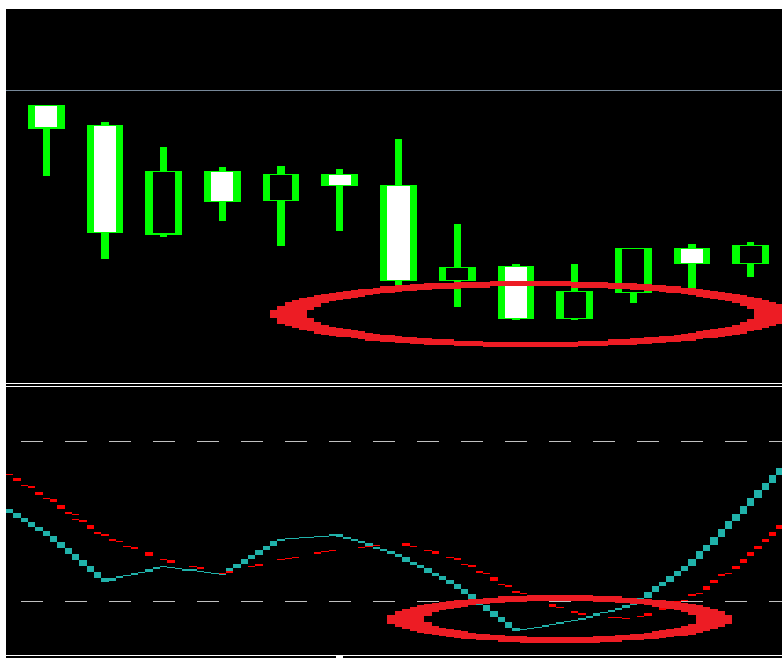
Pairs: EUR/USD

Stochastic Oscillators: The stochastic has moved into overbought or oversold areas

Pip Steps: this pip step is 30 pips. This is the gap of price between each layer position.

The chart must be in a 1 HOUR timeframe using only EUR/USD currency pairs.

Whenever the stochastic oscillators reached into overbought or oversold areas in the current timeframe, the EAs will be ready to initiate its first position.



The above figure shows an example of a setup using the Stochastics Martingale technique. Whenever the stochastic hits the oversold line, it is an indication of a reversal of trend or a retracement. In this example, we can see that after a series of downward movement, the stochastic enters the oversold area. After that, market starts to reverse.

Of course not every market will react into this way. The market moves in a movement that is unpredictable and sometimes very volatile. Therefore, a trading setup is just a rules of entry.

2.6. The Layering and Martingale Proposed Method

The layering is to enter multiple market entry at different prices using the concept of martingale. An example is shown in the figure below.



The first position (green dashed lines) is entered slightly above the second position. When the first trading setup is initiated, the price did not reverse yet. Instead, it continues to move downward. Therefore, after reaching a series of certain gap between prices, the second position is entered at a bigger lot. This is the concept of martingale that will be used in this technique.

The difference between the original martingale and in this proposed is there is no stop losses. The only concept taken from martingale is the increase in lots.

The gap between the first position and second position is the Pip Step. The gap default should be around 30 pips or points but it is adjustable according to the capital. In this example, we can see that the price finally moves up in the favourable way. This technique will be called Stochastic Oscillator Hybrid Technique.

2.6.1. Profit taking

There is no specific profit taking for this technique. The best way is to set a daily range that have a higher probability to be achieved or to manually close all orders. Either way, both are good. For this forex robot, it will be coded so that the user are

able to set their own profit taking target. This is to ensure the flexibility of the expert advisors.

2.7. Samurai Techniques Research

In this stage, the trading techniques research, one techniques have been studied upon. This technique is a private trading techniques that was created by a Malaysian. The trading details is private and confidential is not to be explained. However, this trading techniques was chosen for studies because:

- This technique have managed to help the practitioner make profit and gain their money back in a short term
- This technique is also able to be translated into codes for this Forex robot to work
- High percentage of winning trades ratio

There are only one trading indicator used in this technique which is called the Relative Strength Index (RSI). The RSI is a tool used to measure the strength index of a particular currency. In trading terms, there are situation called overbought and oversold. In overbought, it means the market have move up or bullish for too much that we should now be ready for the reversal and vice versa.

This RSI is used to measure the strength of the currencies. Whenever it reach a certain points, the trading conditions is checked whether it is fulfilled or not. The buying or selling position will then be triggered depending on the situation.

In forex trading, there are a lot of currencies traded. For this samurai technique, the best pair of currencies to be traded is US Dollar – Yen (USD/JPY). This technique when applied on this currency have managed to get at least the capital back in one year at most. This is also in line with the objective of gaining profit of 100% in one year at least.

This technique is also very simple and is not detailed in analysis. It deals with behavior of the currency and utilize the trading tools at a very minimal. After studying the pattern, theoretically it is easy to translate this trading techniques into forex robots.

3. Programming The FBH Robot

The first samurai robot was coded as prototype in order to get the idea of how it will work automatically. MQL4 language codes were studied carefully and the best conventional way of coding the trade is used.

In programming the FBH robot, the complicated part is setting the rules of entry which must follow the trading techniques. One prototype of Samurai Robot have been developed and backtested using historical data.

This coded robot can only work with brokers using the Metatrader 4 platform. It is supposed to be attached into the charts that we are trading which is done as follows.



Figure 8

It is important to code the first robot as soon as possible in order to understand how do this expert advisors do their trades. With this proper understanding of their process, several improvements can be done in the later stage.

4. FBH Robot Backtest Data on Samurai Technique

The first FBH robot have been successfully developed and one of the techniques in it were also backtested to get the results of the trading. Surprisingly, the result of the backtest was a positive results. It managed to achieve one of the objective set in this research. This result is the result from samurai technique implemented in FBH Robot.

4.1. Preliminary Samurai Technique Backtest 1

The backtest of the Samurai robot were done by testing it with \$1000 capital and on USDJPY currency. The time frame of trading done by the robot is on a 15 minutes time frame. The results are published as follows.

Model	Every tick (the most precise method based on all available least timeframes)		
Parameters			
Bars in test	2111 Ticks modelled	1915542 Modelling quality	47.66%
Mismatched charts errors	0		
Initial deposit	1000.00		
Total net profit	265.85 Gross profit	265.85 Gross loss	-0.00
Profit factor	Expected payoff	0.88	
Absolute drawdown	193.57 Maximal drawdown	361.28 (30.94%) Relative drawdown	30.94% (361.28)
Total trades	303 Short positions (won %)	Long positions (won %)	
	Profit trades (% of total)	Loss trades (% of total)	
Largest profit trade		Loss trade	-0.00
Average profit trade		0.88 loss trade	-0.00
Maximum consecutive wins (profit in money)	303 (265.85)	consecutive losses (loss in money)	0 (-0.00)
Maximal consecutive profit (count of wins)	265.85 (303)	consecutive loss (count of losses)	-0.00 (0)
Average consecutive wins		303 consecutive losses	0

Figure 9

This is the first backtest on this incomplete expert advisors. It shows promising end results which resulted in the doubling of capital. However, there are some things that needs to be considered such as the maximal drawdown. The maximal drawdown is around 30.94% which means the highest negative floating profit is around 30.94% before the price finally go back into profit.

More testing and changes need to be done into the technique and coding to ensure a lower maximal drawdown and maintaining a good profit. This preliminary results is a forex robot developed solely using the samurai technique and no other technique is involved although the future planning might include adding extra technique into the expert advisors.

4.2. Samurai Technique Backtest 2

After thorough analysis on this technique and the recent market behaviour, some changes were made to this Samurai Robot. Instead of focusing on both long and short

position, it was changed to only focus on long position. This is due to the nature of the traded currencies which is always exposed to intervention by the Bank of Japan.

The backtest result of the changes is as follows:

Model	Every tick (the most precise method based on all available least timeframes)			
Parameters				
Bars in test	8501 Ticks modelled	5645208	Modelling quality	76.21%
Mismatched charts errors	4			
Initial deposit	1000.00			
Total net profit	996.98	Gross profit	996.98	Gross loss -0.00
Profit factor	Expected payoff		2.44	
Absolute drawdown	366.81	Maximal drawdown	670.63 (51.44%)	Relative drawdown 51.44% (670.63)
Total trades	408	Short positions (won %)	Long positions (won %)	
	Profit trades (% of total)		Loss trades (% of total)	
Largest profit trade			11.23	loss trade -0.00
Average profit trade			2.44	loss trade -0.00
Maximum consecutive wins (profit in money)	408 (996.98)		consecutive losses (loss in money)	0 (-0.00)
Maximal consecutive profit (count of wins)	996.98 (408)		consecutive loss (count of losses)	-0.00 (0)
Average consecutive wins	408		consecutive losses	0

The improvements done compared to the last backtest result is that this new changes increased the risk to 51.44% but with a significant increase in profit. The risk can be derived by subtracting the maximal drawdown from backtest 1 with maximal drawdown from backtest 2.

The profit for the new backtests however, is a little less than the 100% target. It only managed to give a return of around \$996.98. The result however is still in 1 year and there are still few months left before it becomes a new year.

The result of both situations enables a new possibilities and boundaries. Those who are medium risk taker can now either follow the settings for backtest 2 or if the investor is a high risk taker, can go on with setting in backtest 1. In order to satisfy both investors, options have been made available for them to choose which risk they would like to go.

This table shows the differences in result.

	Samurai Technique	Improved Samurai Technique
Risk (Maximal Drawdown)	30.94%	51.44%
Net Profit	\$265.85	\$996.98

Table 1

4.3. The Samurai Model Improvements

The model of improvements from the two techniques is a slight change in the trading conditions. The current model focuses on both buy and sell while the proposed model focus only on buy position.

The model is illustrated below:

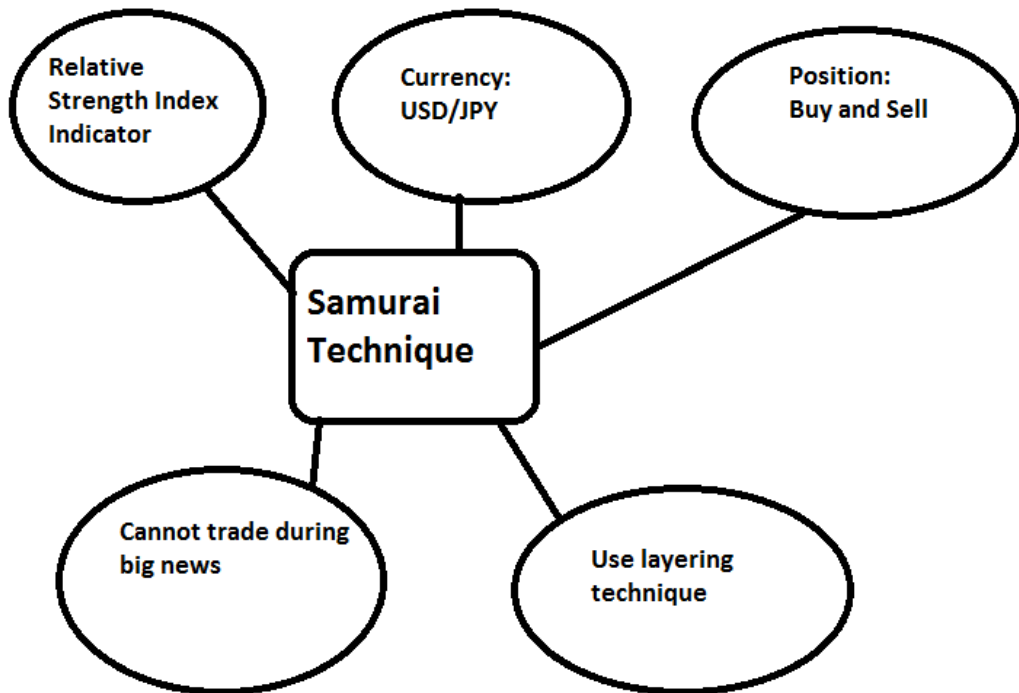


Figure 10

The current samurai model consist of these traits. It is using RSI indicator, the pair used is Dollar/Yen (USD/JPY), focus on buy and sell and also involves layering technique. One of its drawback is it cannot be used during big news.

The improved Samurai Technique Model is better although it only have minor changes. The new model only focus on buy position and trades also be made during big news should the signal occurred.

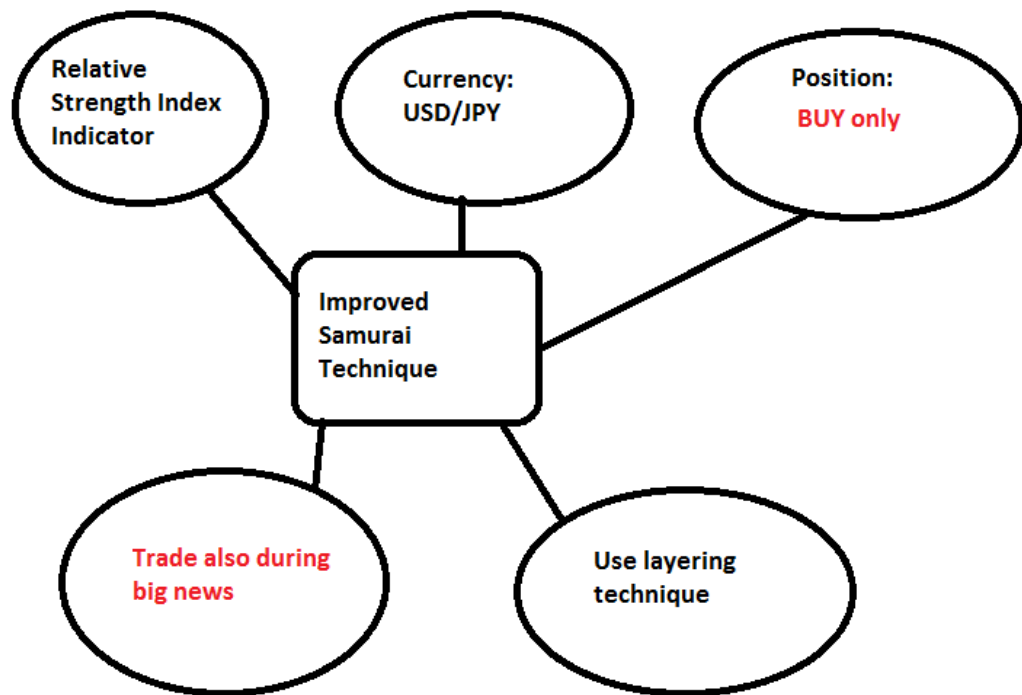


Figure 11

This is the improved model which is implemented in the forex robot.

5. FBH Robot Testing on Stochastic Oscillator Technique

5.1. Stochastic Oscillator Layering

Model	Every tick (the most precise method based on all available least timeframes)			
Parameters				
Bars in test	5790	Ticks modelled	10905421	Modelling quality 61.07%
Mismatched charts errors	16			
Initial deposit	1000.00			
Total net profit	300.68	Gross profit	352.17	Gross loss -51.49
Profit factor	6.84	Expected payoff	0.72	
Absolute drawdown	365.32	Maximal drawdown	678.53 (51.67%)	Relative drawdown 51.67% (678.53)
Total trades	418	Short positions (won %)	Long positions (won %)	
		Profit trades (% of total)	Loss trades (% of total)	
	Largest profit trade		1.38	loss trade -7.31
	Average profit trade		0.86	loss trade -5.15
	Maximum consecutive wins (profit in money)	408 (352.17)	consecutive losses (loss in money)	10 (-51.49)
	Maximal consecutive profit (count of wins)	352.17 (408)	consecutive loss (count of losses)	-51.49 (10)
	Average consecutive wins	408	consecutive losses	10

5.2. Stochastic Oscillator Martingale

Model	Every tick (the most precise method based on all available least timeframes)			
Parameters				
Bars in test	7720	Ticks modelled	5338660	Modelling quality 74.81%
Mismatched charts errors	3			
Initial deposit	1000.00			
Total net profit	1245.23	Gross profit	1245.23	Gross loss -0.00
Profit factor		Expected payoff	3.58	
Absolute drawdown	847.41	Maximal drawdown	1243.78 (89.07%)	Relative drawdown 89.07% (1243.78)
Total trades	348	Short positions (won %)	Long positions (won %)	
		Profit trades (% of total)	Loss trades (% of total)	
	Largest profit trade		14.87	loss trade -0.00
	Average profit trade		3.58	loss trade -0.00
	Maximum consecutive wins (profit in money)	348 (1245.23)	consecutive losses (loss in money)	0 (-0.00)
	Maximal consecutive profit (count of wins)	1245.23 (348)	consecutive loss (count of losses)	-0.00 (0)
	Average consecutive wins	348	consecutive losses	0

5.3. Stochastic Oscillator Hybrid Technique Backtest Result 1

A new technique had been added into this forex robot. This technique has been tested and it shows quite a good return with a very low risk. This technique can be used on a lot of pairs but the result shown here would be for the USD/YEN pair of currencies. It will be using stochastic as its indicator and the trading base will be on either martingale layering or normal layering. Both these concept have been explained beforehand.

Model	Every tick (the most precise method based on all available least timeframes)		
Parameters	TakeProfit=10; StopLoss=0; PipStep=5; LotUsed=0.01; SamuraiTechnique=false;		
Bars in test	8501 Ticks modelled	5645208 Modelling quality	76.21%
Mismatched charts errors	4		
Initial deposit	1000.00		
Total net profit	1828.87 Gross profit	1828.87 Gross loss	-0.00
Profit factor	Expected payoff	1.95	
Absolute drawdown	-409.26 Maximal drawdown	803.81 (38.85%) Relative drawdown	-49.06% (568.98)
Total trades	937 Short positions (won %)	Long positions (won %)	
	Profit trades (% of total)	Loss trades (% of total)	
Largest profit trade		7.33 loss trade	-0.00
Average profit trade		1.95 loss trade	-0.00
Maximum consecutive wins (profit in money)	937 (1828.87)	consecutive losses (loss in money)	0 (-0.00)
Maximal consecutive profit (count of wins)	1828.87 (937)	consecutive loss (count of losses)	-0.00 (0)
Average consecutive wins		937 consecutive losses	0

The figure above is the backtest result for stochastic technique applied on USD/YEN pair. It managed to give a return of around 182.8%. The best part obtained from this result is the risk implied. From the maximal drawdown, it is shown that the highest drawdown or risk is around 38.85% and a relative drawdown of 49.06%.

Comparing this with the other techniques, people might think that this technique have supersede the samurai technique. However, it must be remembered that each technique is only at its best in certain market movement. Therefore, it is better to diversify the techniques so that it can increase the sustainability of the forex robot.

Result Comparison is as follows:

	Stochastic Oscillator Layering	Stochastic Oscillator Martingale	Stochastic Oscillator Hybrid
Risk (Maximal Drawdown)	51.67%	89.07%	38.85%
Net Profit	\$300.68	1245.23	\$1828.87

Table 2

This technique is also an improved technique from the one conventionally used. The model below shows the differences in traits.

5.4. Improvements in Stochastic Oscillator technique

Conventionally, techniques using stochastic oscillator will be using stop losses. This means there will be a limit on how far the market should move against their direction. This means, if the trader bought a currency at 1.3500 and expects the market to go up. However, he also takes precaution that market can make unexpected move. Therefore, he wants to get out of the market should the price jump down into 1.3450. Whenever the market price goes to 1.3450, it will automatically get the trader's order out of the market with a loss in 50 points. This is how stop losses work.

Sometimes, this can cause frustration among traders because the market tends to play with the traders. It is very often to see the price hits the stop losses before finally moving into the direction the traders wanted. Another traits of stochastic oscillator techniques can be seen in the model below.

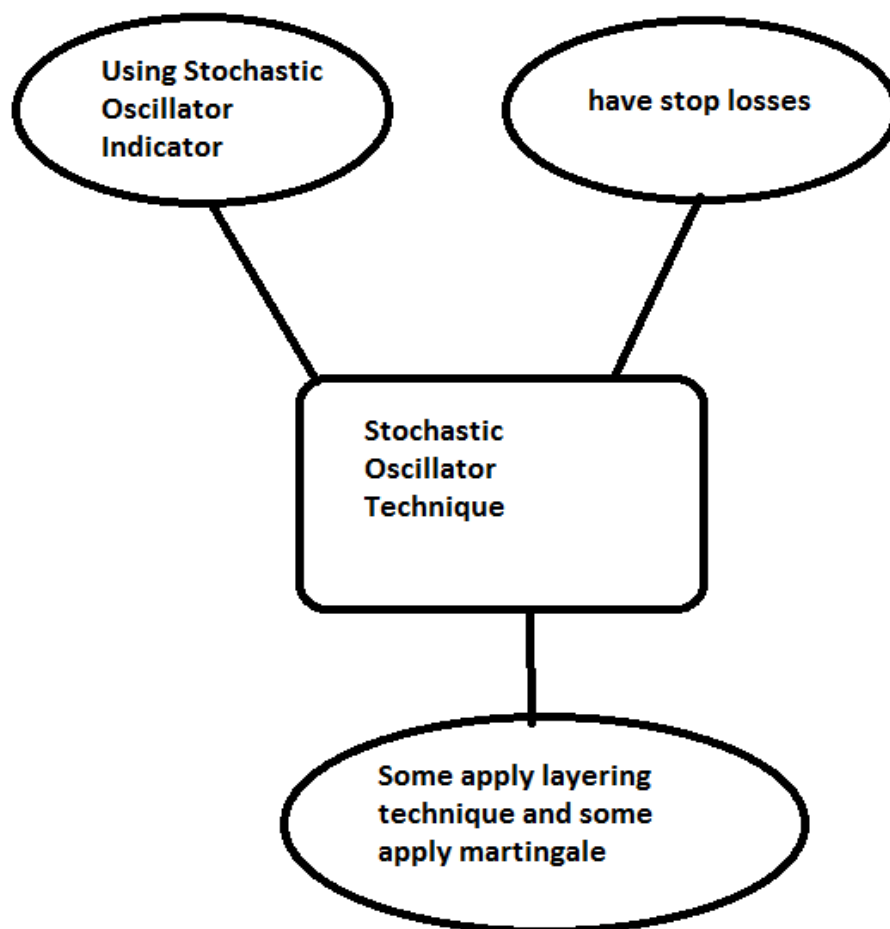


Figure 12

The improved model of Stochastic Oscillator technique will be removing the usage of stop losses, a combination of layering and martingale as well as better risk management with the former. The new proposed model is as below.

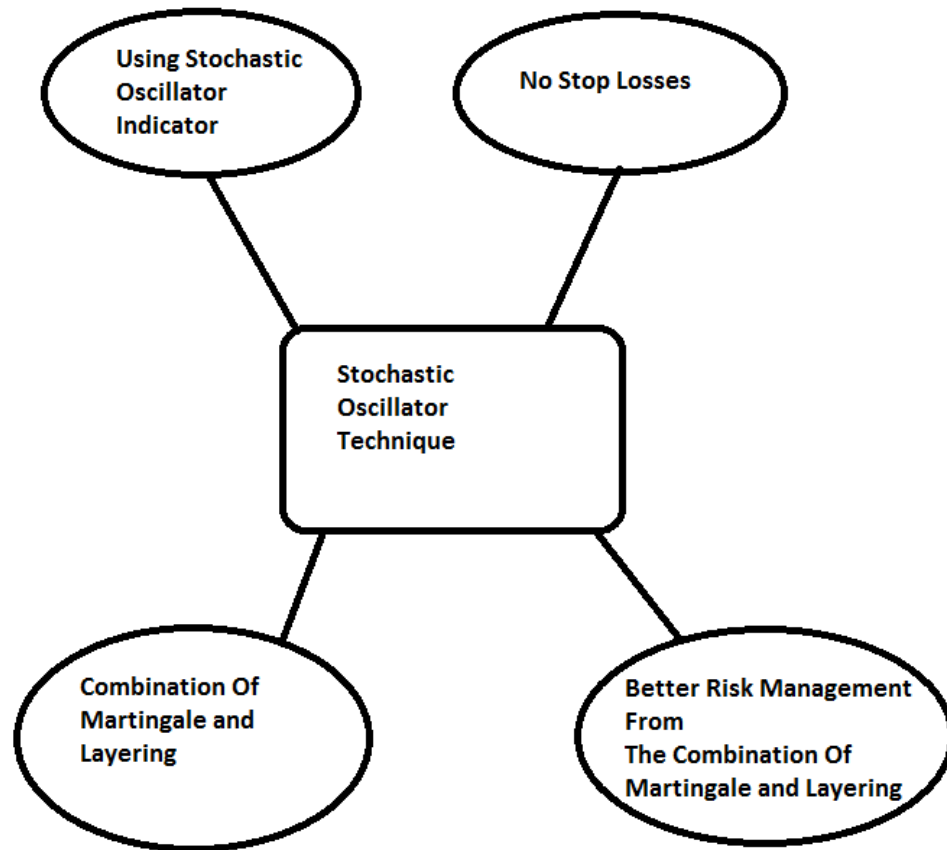


Figure 13

6. Prototype Interface

6.1. Prototype Interface v1.0

The interface of the robot is still in preliminary stages but it will be able to work with any brokers that uses Metatrader 4. There is only one essential function or interface to be used in this robot which is the settings page.

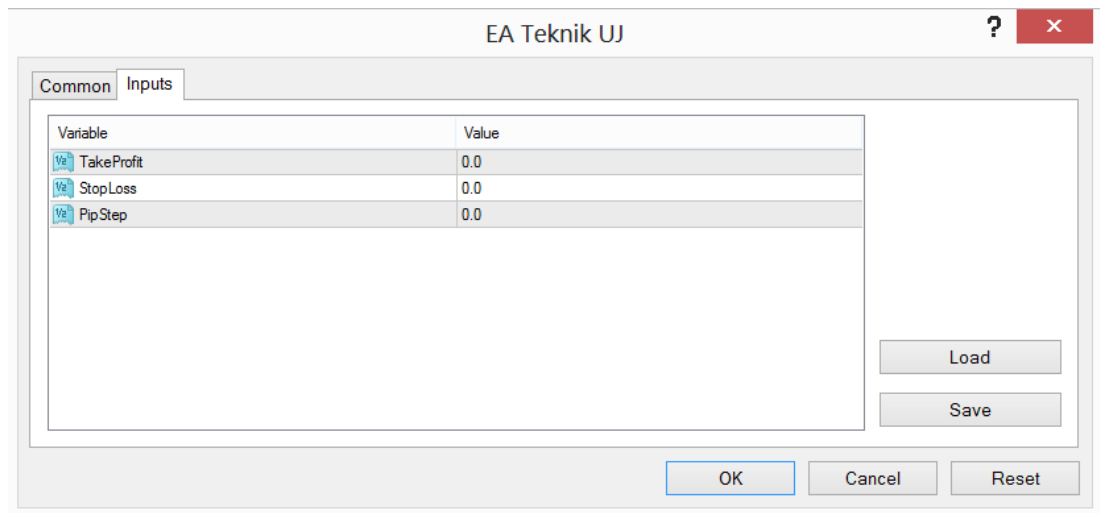


Figure 14

When a robot is attached to a chart, the above window will appear. This is called the settings tab. This tab is the essential part where we set certain trading conditions as well as capital management that the robot will follow when trading. The above example is the preliminary forex interface and it is possible that more options will be added later.

Such settings include how many percentage of equities to be used for each trades, how many risk and total lots. The robot only works in the background following the trading conditions that have been set. Therefore, in order to see how the robot works, we can only see it on charts.

6.2. Prototype Interface v1.1

After the recent changes to the new prototype, there have been a slight changes on the interface. More options have been added into the interface to ensure flexibility on the forex robot.

The new interface is as follows:

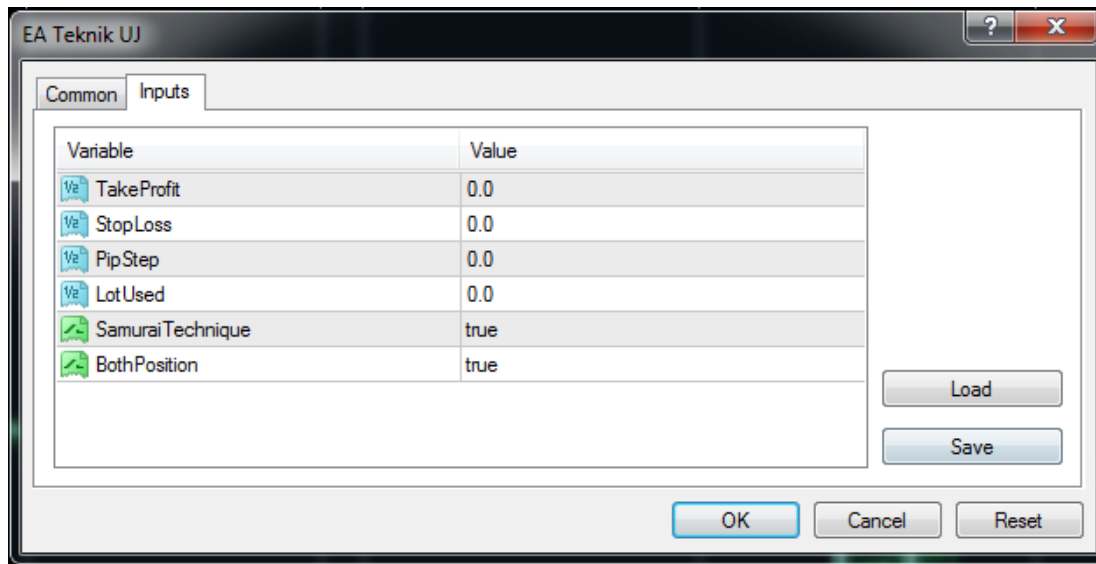


Figure 15

New options compared to the previous one is the addition of PipStep, LotUsed, SamuraiTechnique, and BothPosition option. This enables the investor to customize the settings of this Expert Advisors to suit their capital needs.

The SamuraiTechnique option enables user to switch between techniques. If it is set to true, the forex robot will run with Samurai technique. If it is false, it will be using Stochastic technique.

BothPosition only applies for Samurai Technique. It enables the user to choose whether to let the robot focus on buy and sell or only on buy position. If set to false, it will focus only on buying position.

Another new features added to this robot is the notification system. Each time the market fulfills the trading condition, it will send an alert. This alert is for notification purpose to let user knows that the robot is doing its job.

The alert will be on both positions and for both techniques. The picture below is an example of a notification when the market has reached an overbought condition.

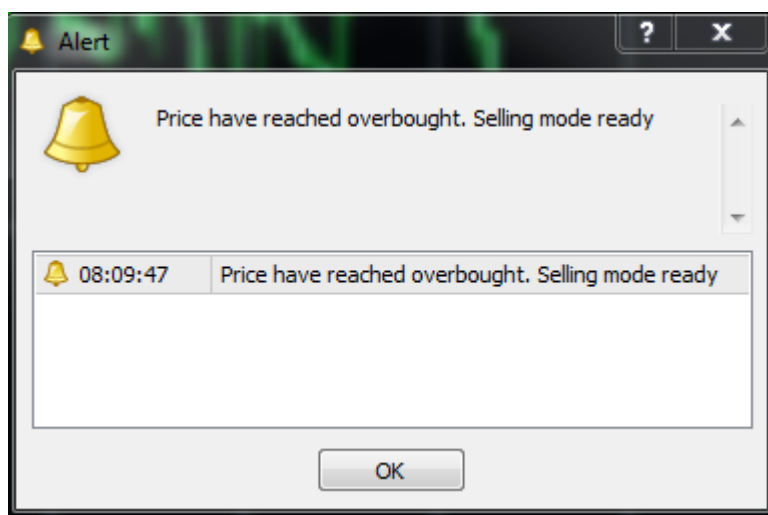


Figure 16

As for oversold, the notification is as follows:

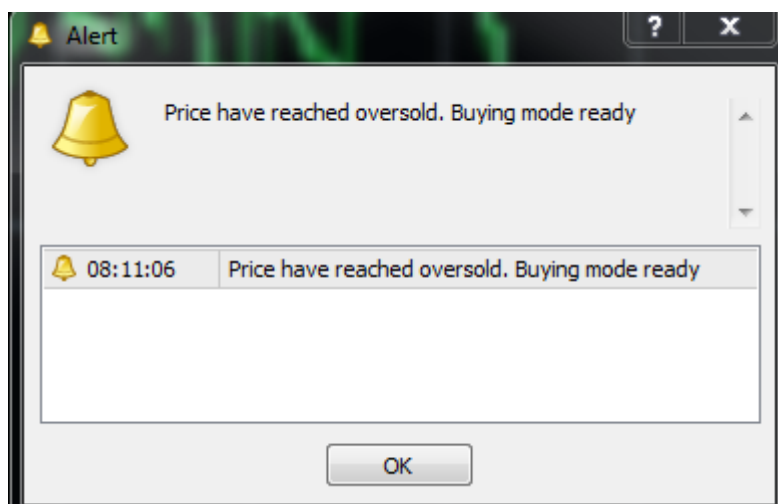


Figure 17

How the robot trades



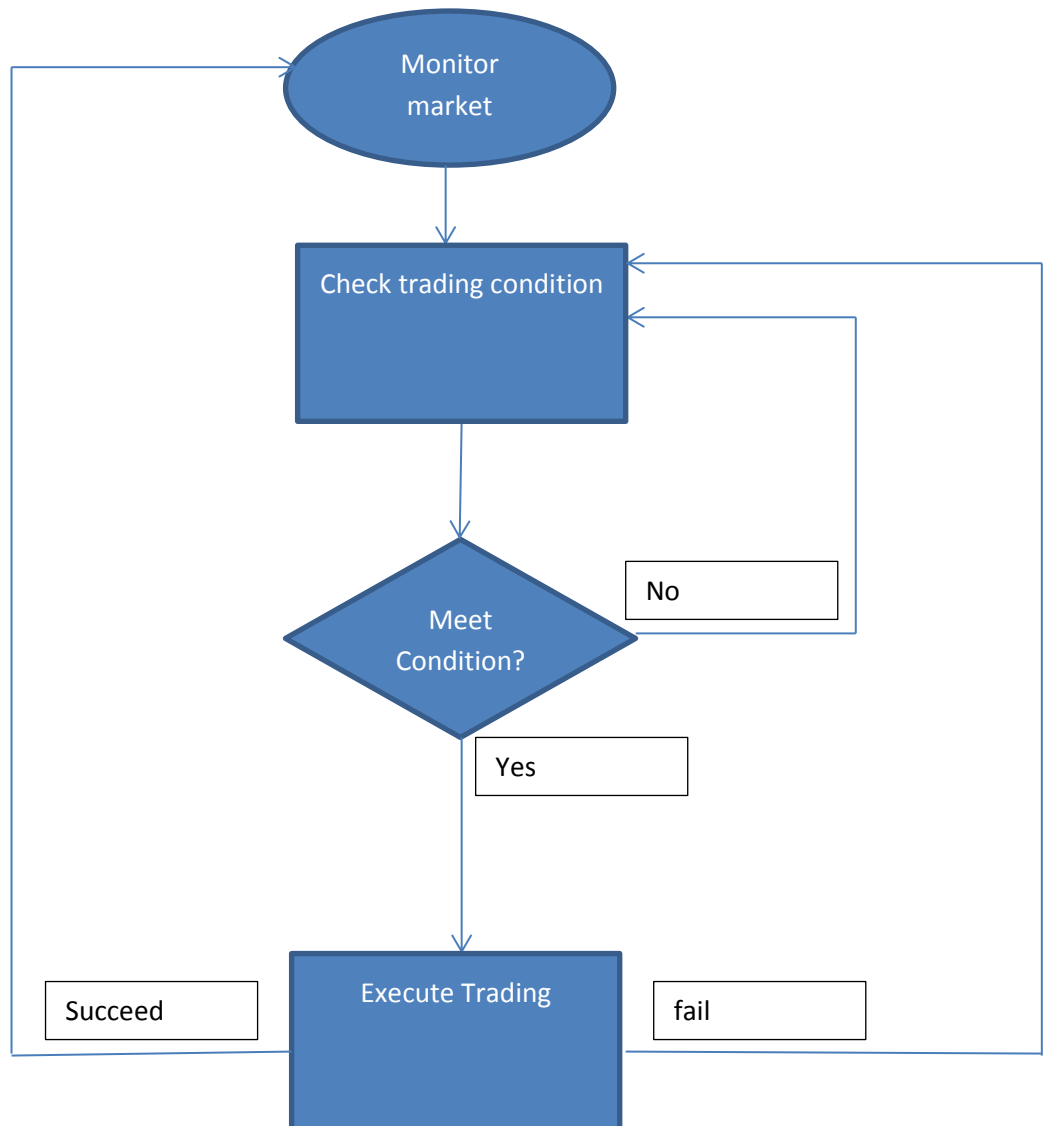
Figure 18

An example of how a robot do its trade can be explained with the picture above.

When the index of the currency at the bottom (circled in red) crosses against each other, we can see that a sell position is open. This will be done by the robots automatically. Whenever, the index crosses, it automatically puts the order into the market.

The above is picture is just an example of how robot do the trading and is not directly related to the trading techniques that will be used.

7. Forex Robot Flowchart



8. Future Planning

The future planning of this project would be to improve more on what should be improved. This preliminary findings and prototype is not the final looks of the project. Specifically, the future planning will focus on:

- Exploring more trading techniques available that is able to give better returns than the current one
- Increasing the user friendliness of the robot or Expert Advisors
- Increasing the features of the robot such as more options in the settings. More options in the settings will enable the user to be more flexible in setting up their money or capital management
- In order to obtain more data, the completed robot will be sent to a few traders for them to test. The results of their testing will be included into the findings
- In the future, the robot will also be able to run on touch screen device such as Microsoft Surface. Microsoft Surface pro is currently the only touch screen device that is able to run a forex robot

Key Milestone

Final Year Project 1

Week	Key Milestone	Status
1	Title/Proposal Selection	Completed
3	Submit Proposal To Research Cluster	Completed
6	Extended Proposal	Completed
12	Viva: Proposal defense and Progress Evaluation	Completed
14	Interim Report	Completed

Table 3

Gantt Chart

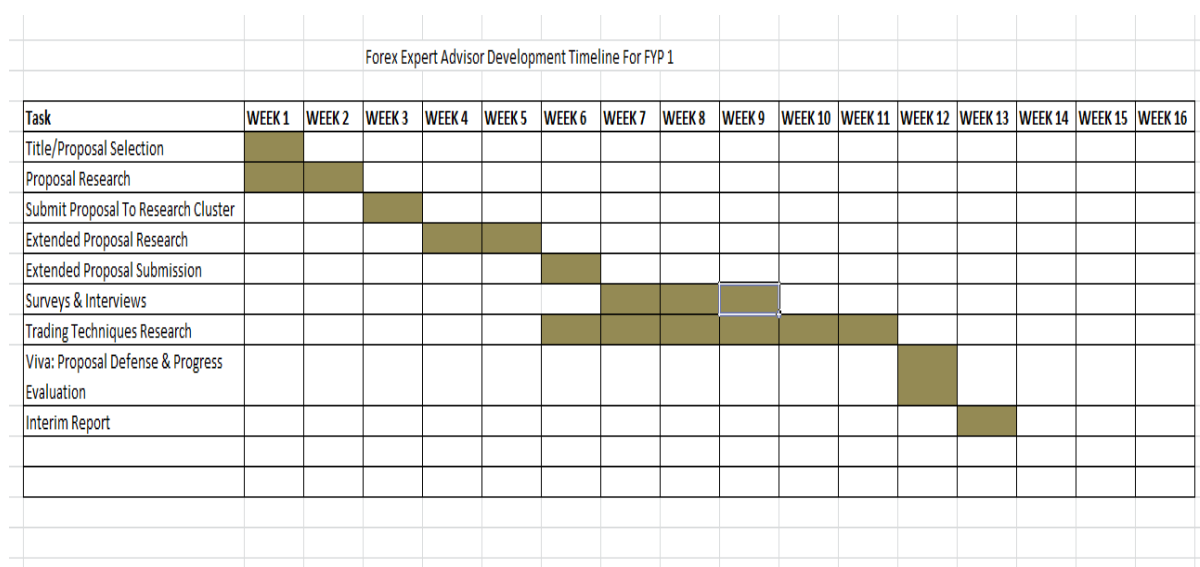


Figure 19

Final Year Project 2

Week	Key Milestone	Status
4	Progress Report	
10	Pre-SEDEX	
11	Dissertation 1 st draft	
12	SEDEX	
12	Online submission of technical report and dissertation	
13	VIVA	
15	Final Dissertation (Hardbound)	

Final Year Project 2 Gantt Chart

Task	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	WEEK 12	WEEK 13	WEEK 14	WEEK 15	WEEK 16
Progress Report																
Pre-Sedex																
Dissertation 1st Draft																
SEDEX																
Online Submission of Technical Report																
Online Submission of Dissertation																
VIVA																
Final Dissertation (Hardbound)																

Chapter 5: Conclusion

Forex Expert Advisor or forex robot do have its advantage and disadvantages. With the advancement of technology, the trading process have also been improved to match up with it. Forex robot is one of those innovations that have changed the perspective.

It is true that some stated that forex robot could be fatal to the account if not used properly, but it should not be a blockage to the research. In this research preliminary findings, it have managed to find a lot of favourable results that favours the usage of this forex robot.

This research will helps in opening up more opportunities of automating the trading process and at the same time, explore more opportunities of making profit with forex robot.

Identifying the problems stated and focusing on solving it will be the key point of this project. Depending everything on the forex robot to do all the work is not advisable as constant monitoring will always be needed. However, if the usage of it could speed up or shorten the process, it is already a contribution into the world of trading.

This will be a good project to encourage people into exploring more about the foreign exchange market and technology used. More often, it is also in line with the course taken which is Business Information System which is a hybrid of Business and Technology. Forex is business and its forex robot is the technology.

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